10/1/15

"Its always too early to quit." - Norman Peale

HW: "Comparing Methods-Long Division, Again?" Problem Set #1, 2

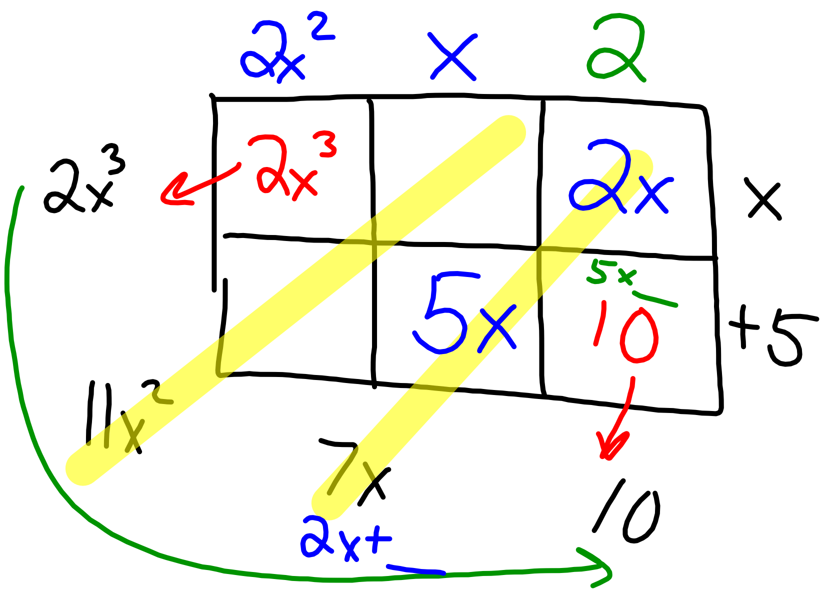
Test 2 Wednessday 10/7

AIM: How do we use long division to divide polynomials?

Warm Up:

Divide the following:

1) $\dfrac{2x^3+11x^2+7x+10}{x+5} = \boxed{2x^2+x+2}$



2) Write the warm up in factored form and then multiply to check your work.

$(x+5)(2x^2+x+2)$

	$2x^2$	x	2
x	$2x^3$	x^2	$2x$
5	$10x^2$	$5x$	10

$2x^3$

$11x^2 \quad 7x \quad 10$

$2x^3+11x^2+7x+10$ ✓

Example 1:

If x = 10, then the division 1573 ÷ 13 can be represented by:

$$
\begin{array}{r}
121 \\
13\overline{)1573} \\
-13 \\
\hline
27 \\
-26 \\
\hline
13 \\
-13 \\
\hline
0
\end{array}
$$

$$
\begin{array}{r}
x^2+2x+1 \\
x+3\overline{)x^3+5x^2+7x+3} \\
-(x^3+3x^2) \\
\hline
2x^2+7x \\
-(2x^2+6x) \\
\hline
1x+3 \\
-(x+3) \\
\hline
0
\end{array}
$$

Example 2:

Use "Long Division" to find the quotient of

need "x" placeholder

$$\frac{2x^3-4x^2+2}{2x-2}$$

$$\boxed{x^2-1x-1}$$

$2x-2\ \overline{)\,2x^3-4x^2+0x+2}$

$-(2x^3-2x^2)$

$-2x^2+0x$

$-(-2x^2+2x)$

$-2x+2$

$-(-2x+2)$

0

x^2-x-1

$\frac{2x^3}{2x}=x^2$

$\frac{-2x^2}{2x}=-1x$

$\frac{-2x}{2x}=-1$

Exercises:

1) $\dfrac{x^2+6x+9}{x+3}$

$$
\begin{array}{r l}
 & \boxed{x+3} \\
x+3 \,\big) & x^2+6x+9 \\
x(x+3) & -(x^2+3x) \\
 & 3x+9 \\
3(x+3) & -(3x+9) \\
 & 0
\end{array}
$$

$\dfrac{x^2}{x} = x$

$\dfrac{3x}{x} = 3$

3) $(x^3-27) \div (x-3)$

$$
\begin{array}{r l}
 & x^2+3x+9 \\
x-3 \,\big) & x^3+0x^2+0x-27 \\
x^2(x-3) & -(x^3-3x^2) \\
 & 3x^2+0x \\
3x(x-3) & -(3x^2-9x) \\
 & 9x-27 \\
9(x-3) & -(9x-27) \\
 & 0
\end{array}
$$

$\dfrac{x^3}{x} = x^2$

$\dfrac{3x^2}{x} = 3x$

$\dfrac{9x}{x} = 9$

x^2+3x+9

$$
\begin{array}{r}
114 \\
12\overline{)1375} \\
-12 \\
\hline
17 \\
-12 \\
\hline
55 \\
-48 \\
\hline
\end{array}
$$

4)

$$x^2+7x+2$$

$$2x^2+0x-3 \overline{\big)\, 2x^4+14x^3+x^2-21x-6}$$

$$-(\cancel{2x^4}+0x^3+0-3x^2)$$

$$14x^3+4x^2-21x$$

$$-(\cancel{14x^3}+0x^2-21x)$$

$$4x^2-0x-6$$

$$-\ 4x^2-0x-6$$

$$0$$

5)

Problem Set

7) $q(x) = 3x^3 - 4x^2 + 5x + k$

a) Find k so that $3x-7$ is a factor. $\boxed{k=-28}$

* When we divide, if there is no remainder than the divisor is a factor of the dividend.

the number you divided by

ex: $\frac{2x}{x} = 2$ { x is a factor of $2x$; 2 is a factor of $2x$ }

* To find out if something is a factor, try to divide it into the expression. If there is no remainder then it is a factor.

* If there is a remainder it is not a factor.

$\frac{7}{2}$ 2 is NOT A FACTOR $\frac{14}{2}$ 2 is A FACTOR

$$\begin{array}{r|l} & x^2+x+4 \\ \hline 3x-7 & 3x^3-4x^2+5x+K \\ & -(3x^3-7x^2) \\ \hline & \quad 3x^2+5x \\ & -(3x^2-7x) \\ \hline & \qquad 12x+K \\ & -(12x-28) \\ \hline & \qquad\quad 0 \end{array}$$

$$\frac{3x^3}{3x}=x^2 \qquad \frac{3x^2}{3x}=x \qquad \frac{12x}{3x}=4$$

$K - -28 = 0$

$$\begin{aligned} K+28&=0 \\ -28\ \ -28& \\ \hline K&=-28 \end{aligned}$$

7c)
What is

$$\frac{3x^3-4x^2+5x-28}{x^2+x+4} = \quad 3x-7$$

8c) Is $x+3$ a factor of x^3-27?

place holders?

$$
\begin{array}{r|l}
 & x^2-3x+9+\frac{-54}{x+3} \\
x+3 & x^3+0x^2+0x-27 \\
 & -(x^3+3x^2) \\
 & -3x^2+0x \\
 & -(-3x^2-9x) \\
 & 9x-27 \\
 & -(9x+27) \\
 & -54
\end{array}
$$

$x^2(x+3)=x^3+3x^2$

$-3x(x+3)=-3x^2-9x$

$9(x+3)=9x+27$

$\frac{x^3}{x}=x^2$

$\frac{-3x^2}{x}=-3x$

$\frac{9x}{x}=9$

Remainder

Therefore Not a factor

⊛

$$\frac{\text{Dividend}}{\text{Divisor}}=\text{Quotient}+\frac{\text{Remainder}}{\text{Divisor}}$$

Ex: $\frac{7}{2}=3+\frac{1}{2}$

$$\frac{x^3-27}{x+3}=x^2-3x+9+\frac{-54}{x+3}$$

HW: Problem Set #8f